



St. Xavier's College – Autonomous Mumbai

Syllabus For I Semester Courses in Zoology (June 2016 onwards)

Contents:

Theory Syllabus for Courses:

S.Zoo.1.01 - Invertebrate Systematics and Biomolecules

S.Zoo.1.02 - Genetics and Evolution

Practical Syllabus for Course: S.Zoo.1.PR

F.Y.B.Sc. Zoology

S.ZOO.1.01

INVERTEBRATE SYSTEMATICS AND BIOMOLECULES

Learning Objectives:

- To teach student basic classification and characteristics of invertebrates and special adaptations of these phyla
- To understand the structure and functioning of basic biomolecules.

UNIT I

INVERTEBRATE CLASSIFICATION -I

- Salient features and adaptations for Phyla and classes.
 - Phylum Protozoa – Reproduction and Skeleton
 - Phylum Porifera- Spicules, canal system
 - Phylum Coelenterata / Cnidaria – Polymorphism, Corals and Coral reefs
 - Phylum Platyhelminthes – Parasitic adaptations in helminthes
 - Phylum Nematoda – Life cycle of ascaris

UNIT II

INVERTEBRATE CLASSIFICATION -II

- Salient features and adaptations for Phyla and classes.
 - Phylum Annelida – Metamerism and Reproduction
 - Phylum Arthropoda – Crustacean larvae
 - Phylum Mollusca – Foot and shells, Torsion
 - Phylum Echinodermata – Water vascular system

UNIT III

BIOMOLECULES

- **Proteins:**
 - Amino acids: Structure and types of amino acids (aliphatic, aromatic, essential, non-essential amino acids)
 - Definition and structure (primary, secondary, tertiary and quaternary) and types of proteins (fibrous, globular, homonomous, heteronomous and oligomeric)
 - Biological role of proteins.
- **Carbohydrates:**
 - Definition of carbohydrates and its classification with egs. Monosaccharides – Glucose, fructose, galactose. Disaccharides – maltose, sucrose, lactose. Polysaccharides – Starch, glycogen, cellulose, chitin and heparin
 - Biological role of Carbohydrates
- **Lipids:**
 - Definition of Lipids, properties and its classification with egs.
 - Essential fatty acids and its importance
 - Biological role of lipids
- **Nucleic acids:**
 - Definition of nucleic acids and its types – DNA and RNA

F.Y.B.Sc. Zoology

S.ZOO.1.02

GENETICS AND EVOLUTION

Learning Objectives:

- To understand the fundamentals of Mendelian genetics and its application
- To understand the basic molecular mechanisms in Mendelian genetics
- To be acquainted with the basics of evolution and the driving forces for the same

Number of lectures: 45

Unit 1

Mendelian Genetics

(20 lectures)

- History of Mendelian genetics
- Concept of gene and allele in genetics.
- Concept of Dominance, Segregation and Independent Assortment
- Mendelian Monohybrid inheritance.
- Exceptions to Monohybrid inheritance: Lethal genes, Co-dominance and Incomplete dominance.
- Mendelian Dihybrid inheritance.
- Variations of Dihybrid inheritance: Recessive Epistasis, Dominant Epistasis, Inhibitory gene interaction.
- Multiple Alleles: Concept. Human Blood group system and Coat colour in Rabbits: Understanding the emergence of these multiple allelic system
- Cytoplasmic inheritance: Kappa particles in Paramecium, Shell coiling in Snails

Unit 2

Human Genetics

(10 lectures)

- Mendelian genetics in humans: Autosomal Dominant inheritance: Huntington's Chorea disorder, Autosomal recessive inheritance: Phenylketonuria, X-linked recessive inheritance: Duchenne muscular dystrophy, X-linked Dominant inheritance: X-linked hypophosphatemic rickets.
- Human pedigree analysis based on inheritance patterns.
- Chromosomal Abberations: - Numerical abnormality: Monosomy – Turner Syndrome; Tetrasomy/Trisomy – Down Syndrome.

Unit 3

Evolution

(15 lectures)

- Why study evolution
- Theories of Evolution:
 - Prebiotic evolution
 - Panspermia
 - Biotic evolution
- Concept of Microevolution and Co-evolution
- Concept of Variation and Genetic drift in population
- Speciation mechanisms: Allopatric and Sympatric speciation
- Isolating mechanisms in nature: Spatial, Ethological, Reproductive
- From water to land: the evolution of legs

Recommended References:

1. Genetics – Strickberger. CB publications
2. iGenetics – Russel.
3. Genetics – Gardener
4. Genetics – Winchester. Oxford IBH publication
5. Principles of Genetic - Sinnott, Dunn and Dobzansky. McGraw Hill Publication
6. Basic human genetics - E.J.Mange and A.P.Mange. Rastogi Publication

Practical Course:

1. Modification of feet in Birds
2. Modification of beaks in Birds
3. Study of fossil and living fossils: Ammonite, Trilobite, Lingula, Limulus
4. Human Pedigree analysis: X-linked recessive, X-linked dominant, autosomal dominant, autosomal recessive trait
5. Multiple alleles
6. Study of Geological Time Scales
